CLAIMS:

1. An apparatus for detecting infrared light absorption by gaseous species in a processing chamber, comprising:

an infrared light source;

a first optical assembly, coupled to a processing chamber, arranged so as to transmit light from the infrared light source into the processing chamber; and

a second optical assembly arranged so as to receive the light passing through the processing chamber and direct the passed light onto at least one optical sensor.

2. The apparatus according to claim 1, wherein the first optical assembly comprises at least one light transmissive window.

3. The apparatus according to claim 1, wherein the second optical assembly comprises at least one light transmissive window.

4. The apparatus according to claim 1, further comprising means to direct light from the infrared light source along a second optical path that reflects the light off a substrate to be processed in the chamber to the second optical assembly, the second optical assembly arranged so as to receive light along the first and second optical paths and direct the light to the at least one optical sensor.

5. The apparatus according to claim 1, further comprising a controller electrically connected to the at least one optical sensor for receiving and processing electrical signals

generated within the at least one optical sensor, so as to provide information pertaining to a spectral content of light incident the at least one optical sensor.

6. The apparatus of claim 1, wherein said infrared light source is a Fourier-transform spectrometer.

7. An apparatus for detecting infrared light absorption by adsorbed species on a substrate in a processing chamber, comprising:

an infrared light source;

a first optical assembly, coupled to a processing chamber, arranged so as to direct light from the infrared light source onto a substrate to be processed in the processing chamber; and

a second optical assembly arranged to receive light reflected off the substrate and direct the reflected light onto at least one optical sensor.

8. The apparatus according to claim 7, wherein the first optical assembly comprises at least one light transmissive window.

9. The apparatus according to claim 7, wherein the second optical assembly comprises at least one light transmissive window.

10. The apparatus according to claim 7, further comprising a controller electrically connected to the optical sensor for receiving and processing electrical signals generated within the optical sensor, so as to provide information pertaining to the spectral content of light incident the optical sensor.

11. The apparatus of claim 7, wherein said infrared light source is a Fourier-transform spectrometer.

12. An apparatus for detecting infrared light absorption by gaseous species and adsorbed substrate species in a processing chamber, comprising:

an infrared light source;

a first optical assembly, coupled to the infrared light source, arranged so as to direct light from the infrared light source along first and second optical paths; and

a second optical assembly arranged so as to receive light along the first and second optical paths and direct the light to at least one optical sensor, wherein the first optical path directs the light through the processing chamber to the second optical assembly, and the second optical path reflects the light of a substrate to be processed in the chamber to the second optical assembly.

13. The apparatus according to claim 12, wherein the first optical assembly comprises at least one light transmissive window.

14. The apparatus according to claim 12, wherein the second optical assembly comprises at least one light transmissive window.

15. An apparatus according to claim 12, further comprising a controller electrically connected to the optical sensor for receiving and processing said electrical signals generated within the at least one optical sensor so as to provide information pertaining to the spectral content of light incident the at least optical sensor.

16. The apparatus of claim 12, wherein said infrared light source is Fourier-transform spectrometer.

17. The apparatus of claim 12, wherein the first optical assembly further comprises a beam splitter for forming plural light beams for the first and second optical paths.

18. A method of measuring infrared light absorption by gaseous species in a processing chamber, the method comprising the steps of:

transmitting light from an infrared light source through a processing chamber;

collecting the transmitted light using an optical assembly;

directing the light onto an optical sensor capable of detecting infrared light;

detecting the light using the optical sensor; and

generating, within the optical sensor, electrical signals representative of the intensity of the light detected.

19. The method of claim 18, the method further comprising the step of using the infrared adsorption by gaseous species to characterize a process step.

20. The method of claim 18, the method further comprising the step of using the infrared adsorption by gaseous species to characterize at least one of a chemical vapor deposition (CVD) process and a physical vapor deposition (PVD) process.

21. The method of claim 18, the method further comprising the step of using the infrared adsorption by gaseous species to characterize at least one of a species to detect an endpoint in at least one of a chamber cleaning process and a chamber conditioning process.

22. The method of claim 18, the method further comprising the step of using the infrared adsorption by gaseous species to characterize at least one of a species to detect an endpoint in a plasma etching process.

23. The method of claim 18, the method further comprising the step of using the infrared adsorption by gaseous species to detect a fault in a plasma etching process.

24. The method as claimed in claim 18, the method further comprising creating a process table containing an acceptable range for the absorption of gaseous species during at least a portion of the at least one process step.

25. The method as claimed in claim 24, the method further comprising the steps of:

performing at least one process step an additional time;

transmitting infrared light in the at least one process step performed the additional time to produce additional infrared absorption of gaseous species;

identifying said additional infrared absorption from the at least one process performed the additional time by measuring light absorbed from said gaseous species;

characterizing the at least one process step performed the additional time using the additional light absorption from said gaseous species from the at least one process step performed the additional time; and

declaring a fault when the at least one process step performed the additional time includes additional light absorption from gaseous species outside of the acceptable range.

26. The method as claimed in claim 18, wherein the method further comprises the steps of:

performing at least one process step an additional time;

transmitting infrared light in the at least one process step performed the additional time to produce additional infrared absorption of gaseous species;

identifying said additional infrared absorption from the at least one process performed the additional time by measuring light absorbed from said gaseous species;

characterizing the at least one process step performed the additional time using the additional light absorption from said gaseous species from the at least one process step performed the additional time; and

determining a change in the absorption of gaseous species over time; and

establishing an endpoint for the at least one process step based on the change in the light absorption of gaseous species over time.

27. The method as claimed in claim 18, wherein the step of detecting comprises detecting light at plural frequencies.

28. A method of measuring infrared light absorption by adsorbed species on a substrate in a processing chamber, the method comprising the steps of:

reflecting infrared light from a substrate in a processing chamber;

collecting the reflected light using an optical assembly;

directing the light onto an optical sensor capable of detecting infrared light;

detecting the light using the optical sensor; and

generating, within the optical sensor, electrical signals representative of the intensity of the light detected.

29. The method of claim 28, the method further comprising the step of using the infrared adsorption by adsorbed substrate species to characterize a process step.

30. The method of claim 28, the method further comprising the step of using the infrared adsorption by adsorbed substrate species to characterize at least one of a chemical vapor deposition (CVD) process and a physical vapor deposition (PVD) process.

31. The method of claim 28, the method further comprising the step of using the infrared adsorption by adsorbed substrate species to characterize at least one of a species to detect an endpoint in at least one of a chamber cleaning process and a chamber conditioning process.

32. The method of claim 28, the method further comprising the step of using the infrared adsorption by adsorbed substrate species to detect at least one of a species to characterize an endpoint in a plasma etching process.

33. The method of claim 28, the method further comprising the step of using the infrared adsorption by adsorbed surface species to detect a fault in a plasma etching process.

34. The method of claim 28, the method further comprising creating a process table containing an acceptable range for the absorption of adsorbed surface species during at least a portion of the at least one process step.

35. The method of claim 28, the method further comprising the steps of:

performing at least one process step an additional time;

transmitting infrared light in the at least one process step performed the additional time to produce additional infrared absorption of adsorbed substrate species;

identifying said additional infrared absorption from the at least one process performed the additional time by measuring light absorbed from said adsorbed substrate species;

characterizing the at least one process step performed the additional time using the additional light absorption from said adsorbed species from the at least one process step performed the additional time; and

declaring a fault when the at least one process steps performed the additional time includes additional light absorption from adsorbed substrate species outside of the acceptable range.

36. The method of claim 28, the method further comprising the steps of:

performing at least one process step an additional time;

transmitting infrared light in the at least one process step performed the additional time to produce additional infrared absorption of adsorbed substrate species;

identifying said additional infrared absorption from the at least one process performed the additional time by measuring light absorbed from adsorbed substrate species;

characterizing the at least one process step performed the additional time using the additional light absorption from said adsorbed substrate species from the at least one process step performed the additional time; and

determining a change in the light absorption of adsorbed substrate species over time; and

establishing an endpoint for the at least one process step based on the change in the light absorption of adsorbed substrate species over time.

37. A method of measuring infrared light absorption by gaseous species and adsorbed species on a substrate in a processing chamber, the method comprising the steps of:

transmitting infrared light through a processing chamber; using a first optical assembly arranged so as to direct the light along first and second optical paths;

transmitting light along a first optical path through gaseous environment to a second optical assembly;

transmitting light along a second optical path, reflecting the light of a substrate to be processed to the second optical assembly;

collecting the transmitted light along first and second optical paths using a second optical assembly, directing the light onto an optical sensor;

detecting the light using an optical sensor capable of detecting infrared light; and

generating, within the optical sensor, electrical signals representative of the intensity of light incident the first and second optical paths.